Department of Energy
Office of Worker Protection Programs and Hazards Management
Radiological Control Technical Position
RCTP 99 - 03

Acceptable Approach for Controlling Individual Doses Inside the Controlled Area, but Outside of Radiological Areas and Radioactive Material Areas

Issue:

Section 835.602(a) of Title 10, Code of Federal Regulations, Part 835 (10 CFR 835), *Occupational Radiation Protection*, indicates that individuals who enter the controlled area without entering radiological areas or radioactive material areas (RMAs) are not expected to receive a total effective dose equivalent (TEDE) exceeding 0.1 rem in a year. The Department of Energy (DOE) contractors have questioned DOE's regulatory intent for this statement.

Introduction:

Title 10 CFR 835 defines the terms "controlled area," "radioactive material area," and "radiological area" (and the six areas that constitute radiological areas) and establishes requirements for posting and controlling access to these areas. Title 10 CFR 835.602(a) indicates that individuals who enter the controlled area, but do not enter radiological areas or RMAs, are not expected to receive a TEDE exceeding 0.1 rem in a year. If the 0.1 rem "dose expectation" was an absolute dose limit, there would be a gap between the controlled area "upper limit" of 0.1 rem a year and the lowest radiological area thresholds. This gap could create compliance problems at some DOE sites, where individuals may perform work in controlled areas that results in doses exceeding 0.1 rem in a year without entering radiological areas or RMAs.

Requirements:

Applicable Requirements (based on the November 4, 1998, amendment to 10 CFR 835)

§ 835.2(a) Definitions

Controlled area means any area to which access is managed by or for DOE to protect individuals from exposure to radiation and/or radioactive material.

Radiological area means any area(s) within a controlled area defined as a "radiation area," "high radiation area," "very high radiation area," "contamination area," "high contamination area," or "airborne radioactivity area" in accordance with this section.

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§ 835.602 Controlled areas.

(a) Each access point to a controlled area (as defined at § 835.2) shall be posted whenever radiological areas or radioactive material areas exist in the area. Individuals who enter only controlled areas without entering radiological areas or radioactive material areas are not expected to receive a total effective dose equivalent of more than 0.1 rem (0.001 sievert) in a year.

Discussion:

In assessing the impact of the controlled area dose expectation, it is necessary to examine its history and the Department of Energy's (DOE) regimen of controls for radiological hazards. The statement in question originated in the DOE Radiological Control (RadCon) Manual, which DOE published in 1992 (see Article 232.1). As originally published, the statement was not a requirement (i.e., the statement was not a "shall" or "should" statement under the established RadCon Manual structure). In the 1994 revision of the RadCon Manual, DOE attempted to clarify the interface between the controlled area and radiological areas, indicating that any area where an individual could receive a TEDE exceeding 0.1 rem in a year should lie within the boundaries of a posted radiological buffer area (RBA) (see Article 233.3). As conceived, unmonitored workers would complete General Employee Radiological Training, perform non-radiological work, and receive only incidental doses outside of the RBA boundary. Monitored radiological workers would complete Radiological Worker Training, perform radiological work, and possibly receive more significant doses inside the RBA boundary. While this control regimen is similar to that implemented at a variety of commercial and military nuclear installations, conditions at some DOE sites prevented its full realization.

During development of title 10 Code of Federal Regulations, Part 835 and its 1998 amendment, DOE assessed the need for codification of requirements for RBAs. However, DOE's regimen of personnel protection, including requirements for individual monitoring, area posting and entry control, and radiation safety training, is based on authorized entry into the defined radiological areas and assessment of likely individual doses, not on the establishment of RBAs . DOE determined that there was no need to establish regulatory requirements for RBAs to ensure compliance with these primary requirements. The use of RBAs has been retained in DOE radiological control guidance. In addition, the RMA was codified by DOE in the 1998 amendment to enhance the protection of individuals in controlled areas.

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DOE also evaluated the need for specific entry control requirements for lower hazard areas. In the 1998 amendment of 10 CFR 835, DOE codified requirements for posting and control of RMAs. However, DOE did not include the term "radioactive material area" in the definition of the term "radiological area." Therefore, RMAs are not subject to the radiological area entry control requirements of § 835.501. DOE does not believe that the hazards present in RMAs (based on potential individual dose equivalents exceeding 0.1 rem in a year under a conservative exposure scenario, but less than the radiological area hazard thresholds) warrant such stringent entry control measures. For more information on this issue, review the preambles of the 1996 proposed 10 CFR 835 amendment and the 1998 final amendment (References 1 and 2).

The controlled area dose expectation, having been derived from the RadCon Manual, has a narrative structure and does not state an explicit requirement. This statement reflects DOE's expectations for conditions inside of controlled areas, but outside the boundaries of radiological areas and RMAs. The dose expectation provides a link to related regulatory requirements, serving as a reminder of the need for specific individual monitoring and radiation safety training measures under certain conditions, and application of the as low as reasonably achievable (ALARA) process, even though the specified individuals may not enter radiological areas or RMAs. This understanding is consistent with the prior usage of the same statement in the RadCon Manual.

Technical Position:

The 0.1 rem in a year dose expectation discussed in § 835.602(a) is not a limit, but represents DOE's expectation for conditions within controlled areas, but outside of radiological areas and RMAs. It does not require DOE's operating entities to take specific actions to prevent individuals who enter controlled areas, but who do not enter radiological areas, from receiving more than 0.1 rem in a year. Individuals who enter the controlled area, but do not enter radiological areas or RMAs are often, but not always, only incidentally exposed to radiation and radioactive materials. While DOE's expectation is that incidentally-exposed individuals will receive less than 0.1 rem TEDE in a year, 10 CFR 835 does not require specific controls to limit individual doses (other than doses to minors and members of the public) to this level.

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DOE's operating entities are required to establish programs to limit individual dose equivalents consistent with the dose limits established in Subpart C of 10 CFR 835 and the ALARA process as required under §§ 835.101 and §§ 835.1001 - 835.1003. Subparts E, F, G, J, and K of 10 CFR 835 establish requirements for individual monitoring, entry control, area posting, radiation safety training, physical design features, and administrative controls, that support these requirements and provide flexibility for establishing controls that are commensurate with the hazards. The requirements are complemented by guidance provided in DOE's series of Guides G441.1-1 through G441.1-13 and DOE-Standard-1098-99, Radiological Control. These requirements, when implemented as required by a documented radiation protection program approved by DOE, fully satisfy DOE's expectations for controlling exposure in controlled areas, radiological areas, and RMAs.

References:

1. 10 CFR 835, *Occupational Radiation Protection*, U.S. Department of Energy, November 4, 1998.

2. 10 CFR 835, *Occupational Radiation Protection, Proposed Amendment*, U.S. Department of Energy, December 23, 1996.

3. DOE/EH-0256T, *DOE Radiological Control Manual*, Revision 0, U.S. Department of Energy, 1992.

4. DOE/EH-0256T, *DOE Radiological Control Manual*, Revision 1, U.S. Department of Energy, 1994.

5. DOE-STD-1098-99, Radiological Control, U.S. Department of Energy, 1999.

6. DOE Guides G441.1-1 through G-441.1-13, 1998 and 1999.